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THE RUFOUS OR THATCHING ANT OF DAKOTA AND COLORADO.

By Henry C. McCook, D. D.

During the autumn of 1883, I had a series of conversations with Mr. B. S. Russell, an intelligent business man, resident at Jamestown, Dakota, concerning a species of ant which inhabits that Territory. At first I was inclined to think that the insect which Mr. Russell described was the Occident ant, especially as the popular name which it bears among the pioneers is the "stinging ant," but further details caused me to suspect that the habits described must be those of *Formica rufa*, whose nests I had observed in various parts of Colorado. I accordingly entered into correspondence with Dr. R. G. De Puy, of Jamestown, who forwarded me specimens which proved to be *Formica rufa.* I also gave him a number of points to be noted, and directions as to how to proceed in studying these points; all of which were followed up with accuracy and intelligence, that covered all my inquiries. The notes which follow I have written out from the observations of the two gentlemen above named. and those made by myself in Colorado.

Locality and Site.—The entire rolling prairie country lying between the Cheyenne and James Rivers (Dakota), is dotted with a vast number of ant-hills, which extend westwardly as far as the Missouri River. Mr. Russell could not say whether they are to be seen in the Red River Valley, which, however, is frequently overflowed. I first met the hills of Rufa on the "Divide," northeastwardly from Colorado Springs. Subsequently I saw them in South Park, and afterward in the vicinity of Leadville. They were scattered here and there throughout the woods and clearings, along the trails and near the diggings, within the limits and suburbs of the "Camp," as the place was then (1879) called, and were struggling with the miners, with varying success, to maintain their little "claims." I was struck by the fact that these persistent creatures had been able to push up their domiciles to such high sites, and to hold them against the rigors of the winter frosts.

Specimens sent me from Iowa Gulch, near Leadville, by Mr. C. O. Shields, were taken from an elevation of 11,300 feet above the level of the sea.

This characteristic the American Rufas have in common with their European congeners; the *F. rufa* of Switzerland, for example, is found as far up the Alps as the line of vegetation, further progress being apparently limited by the lack of vegetable growth rather than by the temperature.[1] They may, therefore, be reckoned, both on this continent and Europe, as among the most hardy of the ant fauna, best adapted to contend with severities of cold.

Exterior Architecture of Mounds.—The ant-hills in Dakota are for the most part conical elevations, somewhat flattened at the top (fig. 1). Some present the peculiarity of a square base, giving the hill the shape of a pyramid, whose apex is rounded (fig. 2). Dr. De Puy's measurements show heights varying from one foot and a half, to eight inches. The slopes of the sides in two cases are twenty-one and twenty-three inches respectively; two diameters measured are two feet, and one foot six inches, respectively; and one mound gave a measurement of ten feet around the base. The mounds, according to Mr. Russell, average from twelve to fifteen inches in height, and about eighteen inches in base diameter. They are separated from each other by interspaces of from twenty to sixty feet, and are scattered over the prairie in groups or "villages." Dr. De Puy says that one may travel miles without seeing ant-hills, and then come upon clusters of them.

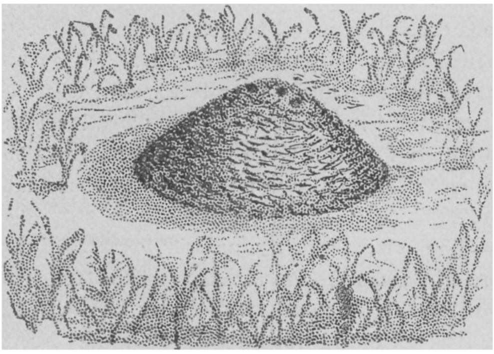

FIG. 1. Conical Mound.—Dakota.

The mounds which I observed in Colorado were chiefly circular elevations of earth, very much flattened at the top (fig. 3). They varied greatly in size, but rarely rose to a greater height than eight inches. One mound observed in South Park and figured, was shaped like a stocking (fig. 4), an odd form certainly, and probably caused by the colony pushing up the earth from two independent centres, which in the course of time united. Future labors might possibly correct this, and round the outlines to their normal shape. I saw one formicary in South Park, which was established under a large stone, along the edges of which the gates or openings were placed. Another was seen on the Divide beyond Colorado Springs, domiciled under an old log in a grove. Here several ant-lions (*Myrmeleon*) had established themselves, cannily digging their pits near the very gates of the formicary, quite in the route of the outcoming and ingoing emmets. The largest mound seen by me, and larger than any reported to me, was found near the summit of the Ute Pass. It was a conical heap, four feet long and about one foot high, and looked like a small haycock.

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[1] *Catalogue des Formicides d'Europe*, by Emory and Forel, p. 450, Mittheilungen der Schweizerischen entomologischen Gesellschaft.

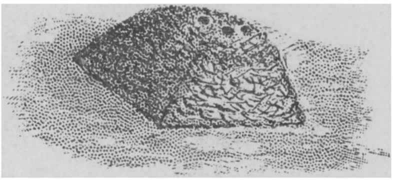
FIG. 2. Mound with Square Base.—Dakota.

Thatching the Roofs.—This Ute Pass ant-hill was thickly covered or thatched with bits of wood, fallen needles and broken sprigs of pine, which had been gathered from the forest debris, lying abundantly in the vicinity. All other mounds in South Park and around Leadville were covered in a like manner, with stalks of grass, twigs, and similar rubbish.

The Dakota ant-hills are thatched in precisely the same way, so that one can easily see the propriety of giving the little artisan the popular title of the Thatching ant. As the colony increases its numbers, and the necessity of internal domestic economy requires enlargement of the nurseries, rooms and galleries, the excavated soil is brought up and naturally is laid upon the thatching. In course of time a new roof of chips and clipped grass is overlaid, and thus in the ordinary growth of a mound there would be an alternation of layers of earth and vegetable substance, the latter falling into decay in due season. This theory of the growth of a hill is confirmed by samples of material taken by Dr. De Puy from the interior of the Dakota mounds, which consists of partly decomposed straw, mixed in smaller proportion with soil. The mound-making ants of the Alleghenies (*Formica exsectoïdes*) have a similar habit of thatching their hills, but this is not as decidedly developed and characteristic as with the Rufous ant; indeed, so far as my observation extends, it is the exception rather than the rule. The thatching habit is possessed by the European representatives of the species (*F. rufa*), in equal degree with those of our Western plains.

Interior Architecture.—I requested Dr. De Puy to open the hills by sawing down through the middle to the surface of the ground, and shoveling away one of the halves. This exposed a section view of the interior, and presented the remarkable feature shown at fig. 5.[1] The central part of the mound, on or about the level of the surface, was found to be occupied by a ball of twigs (B, fig. 5), about eight inches in diameter; the sticks are longer and thicker than those used upon the roof, some of them being two and a half and three inches long. They were found unmixed with soil or any other substance. Several galleries, about one-fourth of an inch in diameter, led upward from this billet-globe to the surface, having their outlet by circular openings (G) through the thatch. The openings, as seen by Dr. De Puy, were usually near the summit and never more than three in number. In Colorado mounds the openings were spread over the top, and were more numerous. Beneath the faggot-ball a series of galleries, seven in number, extended downward to at least the distance of four and a half feet, the extent of the excavation made by Dr. De Puy. For several inches, immediately below the ball, the galleries were united into a network (n, fig.

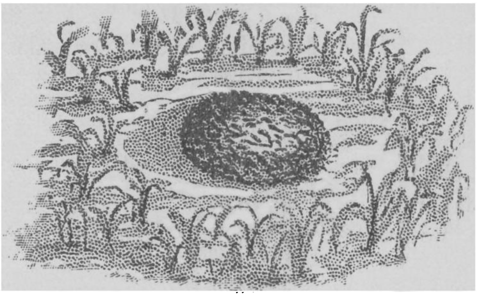

FIG. 3. Flat Circular Mound.—Colorado.

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[1] I was unfortunately so situated in the South Park and elsewhere in Colorado, in part by the presence of a sick companion, that I could not delay to open the hills there seen, and make a study of the interior. But I have no doubt that they are arranged like those in Dakota. Will not some observer on that field test the matter by opening a few hills?

5) of communicating ways, by galleries running crosswise. Beyond this, they descended separately, having no connection at all, so far as could be observed. At the time that Dr. De Puy opened this nest the ground was already frozen, making the digging quite difficult. No ants were found except a few stragglers who were encamped within the faggot-ball, the mass of the community having evidently taken up their winter-quarters in regions further underground than the point reached, and not improbably below the reach of frost. The purpose of the faggot-ball can now only be conjectured. I can think of nothing quite analogous to it in any formicary known to me; it suggests the globe of curled rootlets and dry grass which I have found within the cavern of that hymenopterous ally of the ant, the humble-bee (*Bombus virginicus*), and perhaps may serve the same purpose, viz.: that of a general nursery and common living-barracks for the family. At least, I have no better conjecture to venture at this time. It is curious to note such resemblances in habit between distantly removed members of an order of insects; but the fact is no more, indeed not so much of a surprise, as to find in the caves of the Texas Cutting ant (*Atta fervens*) a leaf-paper rudely-celled nest, the product of a habit which exists in perfection in those other hymenopterous allies, the paper-making wasps.

Marriage Flight of the Sexes.—Mr. Russell informed me that the ants appear in the spring with the first vegetation, and by the time of hay-harvest, the latter part of July, numerous swarms of "flying ants" are seen. These, of course, are the young males and females who, being matured, abandon or are pushed out of the home-nest for the marriage flight to meet and pair in the air. At this period the swarms are very annoying to the inhabitants. A person driving or riding over the prairie will find himself suddenly in the midst of one of these hosts. The insects settle upon the body, creep into the openings of the clothes, and produce a disagreeable sensation. Such a swarm settled upon the first house which Mr. Russell built, and the carpenters were compelled to abandon it while in the act of shingling the roof. In the hay-field, the harvesters are often obliged to stop to fight off the winged hosts, and those in charge of the hay-wagon to abandon for the time the stack which is being hauled to the barn, on account of the annoying creatures. The same is true of the grain harvest which comes later, the appearance of the swarms continuing throughout August and into September. The ants, however, do not sting, my informant averred, notwithstanding their popular title of "the stinging ants." The nervous irritation produced by contact with such numbers is the chief annoyance. Some horses show great excitement under the visits of the swarms, to which the more stolid mule is quite indifferent. These flying ants do not get angry when beaten off, and rush at and follow after the parties attacking them as bees do; they whirl round and round in dense masses, alight upon an object within their path, but show no sign of hostility or wish to pursue human or other animals who approach them. The family of ants to which this genus (*Formica*) belongs, has no members possessed of true aculeate organs. The so-called "sting" is really produced by the insect "biting" or abrading the skin with its mandibles, and then ejecting formic acid from its undeveloped stinging organs into the wound. The smart of the acid is quite severe.

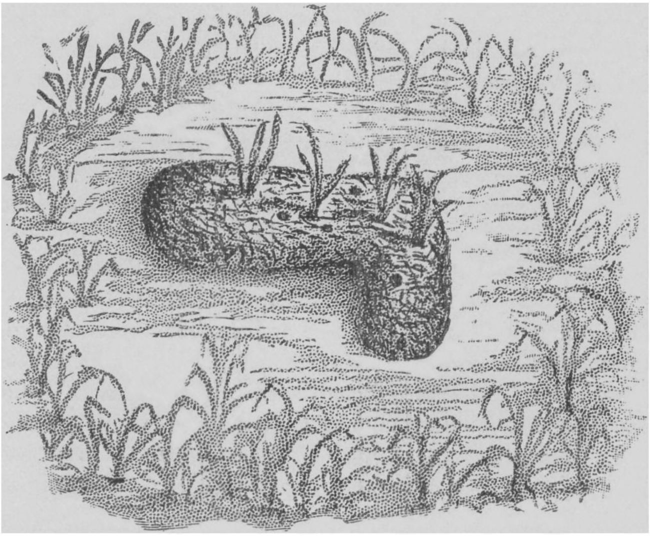

FIG. 4. Stocking-Shaped Mound.—Colorado.

A Useful Insectiverous Habit.—Over against this annoyance

Mr. Russell placed an odd advantage, which he had often observed to be of some importance. When a grain-farm is to be opened, and the prairie sod "broken," a large number of men will be employed to manage the plows. These laborers are provided with barracks or a "camp outfit," and by reason both of personal uncleanliness, and the abundance of certain objectionable insects in the prairie grass, soon become infested with parasites. Flannel clothes and blankets are populous by the middle of June. The manner in which the ants are turned in as scavengers may be illustrated by one instance recited.

"One of my camp cooks," said Mr. Russell, "came one day to borrow a horse. 'What for?' I asked. 'I want to go out on the prairie,' was the answer. 'Number Seven (the name of the camp) is in a pretty lively condition; and, to tell the truth, my clothes are full of lice, and I want to go out to the ant-hills and get rid of them.'

"I gave the man the horse; off he drove, stripped piece by piece, and spread his duds and wraps upon the hills. In a few moments they were fairly covered with ants who thoroughly explored and cleaned every fibre, removing both insects and eggs. The cook came back happy and clean. That was a constant custom then (1880), and is continued by the camp people to this day. The 'cleaning up' takes the greater part of a day."

The Dakotans have thus only discovered a formicarian habit which the Indians of the plains, and old pioneers and campers, utilized many years ago.

Enemies and Destructive Agents.—In the "breaking season," many of the ant-hills are torn up by the plows. At such times flocks of blackbirds, both black and yellow-winged species, follow in the furrows, and feed upon the ants. There seems to be no end to the capacity of these birds for this sort of food. The tender larvæ, exposed by the plowshare, are probably also attractive morsels, but Mr. Russell could not say as to that; to him the birds simply seemed to be picking up ants.

In this connection a fact was related which may well excite surprise. The prairie-fires often completely destroy the hills, burn them quite up, and penetrate far enough beneath the surface to leave a hole that would contain a bushel-basket! This statement, made early in the conversation and while I supposed that I was listening to some observations upon the Occident ant—for Mr. Russell spoke of the insects by their popular name of "stinging ants" — awakened my suspicion. I knew that a mass of gravel-covered dirt, such as the genuine stinging ants—the Occidents—heap up, would not melt away in such wise before a prairie-fire. A few questions satisfied me that I was on the wrong trail, and that no other ant than *Formica rufa* could build a nest liable to such an accident, and that even she could do so I confess I seriously doubted.

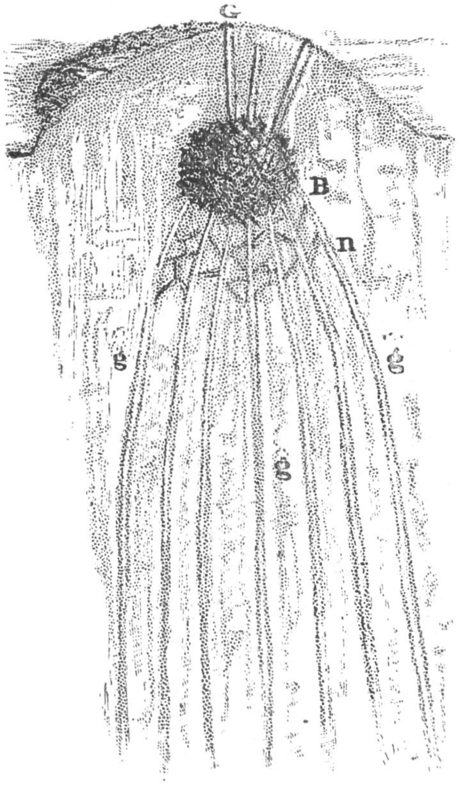

FIG. 5. Half section of mound of *F. rufa*, 4 ft. 4 in. below surface. B, central ball of sticks and straws; g, g, g, galleries; n, network of crossing galleries just below the ball; G, gates.

I had no reason to dispute the veracity of my informant, but I thought it quite as well to test his statements. Accordingly I had Dr. De Puy send me samples of the material of the mounds at points below the surface. The results I have already mentioned, and they show that Mr. Russell's statement is entirely credible. The heavy thatch of dried grass upon the roof, the mixture of soil and decayed straw which composes the cone, the faggot-ball at the heart of the hill, together make up a highly inflammable mass. This freely feeds the flames that eat into the subsoil of the prairie, which is decomposed clay and lime. Thus the story of a casual lay observer, which might have been rejected with apparent reason, was confirmed by careful examination.

The mounds exposed to these prairie-fires are frequently preserved from destruction in a rather remarkable way. A narrow belt of smooth soil generally surrounds the base of a hill (see figures above), on the outer margin of which (in old formicaries especially) springs up a circle of a tall, stiff, thick-stalked grass, such as always grows upon the heaps which the badger throws up when burrowing after gophers. This grass remains green until late in the fall, and when the dry prairie is swept by the flames, it stands as a breastwork around about the mounds, often deflecting the fire or greatly modifying its destructive effects. In this way the formicaries are kept safe within the girdling ranks of the friendly plant.

Concerning the effects upon the ants of the severe winters of Dakota, I could get no information; but as the frost is said to penetrate to the distance of seven feet, I conjecture that the insects must carry their galleries below that depth, though they are doubtless capable of enduring a very low temperature. The surface is thickly covered with snow during winter months, and it is probable that the ants then are in a semi-torpid state. They reappear in the spring with vegetation. It is a difficult matter to exterminate a colony by artificial means.

The saying is current among the people of this section, reported both by Dr. De Puy and Mr. Russell, that if one wants to dig a well he will find water by going down through an ant-hill. I heard the same proverb in Texas applied to the Agricultural and especially to the Cutting ants. My experience is that these popular traditions often have some basis of truth, but in this case I give little credit to the notion. As these Dakota ant-hills are scattered over the whole rolling prairie country at not very great intervals, there certainly can be no likelihood that the people will ever lack water, as a well might be successfully sunk anywhere, according to emmet indications. A rule of this sort could not be worth much in such a country. In Texas the notion is based upon a supposed necessity for the ants to have access to underground sources of water.